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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,438	10/29/2003	Hong-Seong Son	8028-29 (SPX200211-0050US)	6816
22150	7590	01/07/2005	EXAMINER	
F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			LEBENTRITT, MICHAEL	
			ART UNIT	PAPER NUMBER
			2824	

DATE MAILED: 01/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/696,438

Applicant(s)

SON ET AL.

Examiner

Michael S. Leventritt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-18, 21 and 22 is/are rejected:
- 7) ☐ Claim(s) 9 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 22 is rejected under 35 U.S.C. 102(e) as being anticipated by Roberts et al, US Patent 6,461,914 (previously cited).

Roberts discloses forming an insulating layer (20) on a substrate (10), forming an interconnection line (30,40) within the insulating layer, wherein the interconnection line is a first electrode of the metal-insulator-metal capacitor, forming a dielectric layer (50) on the insulating layer including the interconnection line; forming an electrode layer (60) on the dielectric layer, forming a photoresist pattern (80) on the electrode layer; and etching the electrode layer using the photoresist pattern as a mask to form a second electrode (65,75) of the meta-insulator-metal capacitor. Please see figures 1-10 and discussion on column 3, line 30 to column 5, line 55.

***Claim Rejections - 35 USC § 103***

Claims 1-4,6,8,10-15,17,20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al, US Patent 6,461,914 (previously cited) and further in view of Applicant's Admitted Prior Art.

Roberts discloses forming a first insulating layer (20) on a substrate (10). forming an interconnection line (30,40) within the first insulating layer, wherein the interconnection line functions as a first electrode, forming a second insulating layer (50) on the first insulating layer including the interconnection line, forming an electrode layer (60) and an oxide layer (70) on the second insulating layer (50) forming a photoresist pattern (80) on the oxide layer, etching the oxide layer and the electrode layer to form a second electrode and an oxide layer pattern (80,75,65) stacked over the interconnection line, wherein at least the electrode layer is etched; and removing the photoresist pattern. Roberts further discloses wherein the interconnection line is formed from a copper layer; wherein the second insulating layer is formed of a dielectric layer, wherein the electrode layer is formed of one of a tantalum layer, a tantalum nitride layer, a titanium layer and a titanium nitride layer; one of a tungsten layer and a tungsten nitride layer. Wherein the electrode layer is formed from metal and wherein the interconnection line is formed from metal.

In regards to claim 13; Roberts discloses forming a first insulating layer (20) on a substrate (10) forming an interconnection line (30,40) within the first insulating layer, wherein the interconnection line functions as a first electrode, forming a second insulating layer (50) on the first insulating layer including the interconnection line; forming an electrode layer (60) on the second insulating layer, forming a photoresist

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pattern (80) on the electrode layer; and etching the electrode layer to form a second electrode forming a first insulating layer on a substrate. Please see figures 1-10 and discussion on column 3, line 30 to column 5, line 55.

Roberts is applied supra but lacks the anticipation of wet etching the electrode layer. AAPA teaches wet etching the electrode layer (column 3, lines 15-20). In view of this disclosure it would of been obvious to one of ordinary skill in the art at the time of invention to wet etch the electrode layer as taught by AAPA, in view of the primary reference of Roberts because the wet etching provides an excellent selectivity ratio.

Claims 5 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts and AAPA as applied to claims 1-4, 6,8,10-15,17,20 and 21 above, and further in view of Murata, US Patent 6,762,109.

Roberts and AAPA are applied supra but lack the anticipation of wherein the dielectric layer is formed of one of a silicon nitride layer, a silicon carbide layer, a silicon oxycarbide layer and a silicon carbonitride layer. Murata discloses forming a dielectric layer (78) (See figure 50). Inv view of this disclosure it would have been obvious to one of ordinary skill in the art at the time of invention to form said dielectric layer from on of a silicon nitride layer, a silicon carbide layer, a silicon oxycarbide layer and a silicon carbonitride layer as taught by Murata, in view of the primary reference of Roberts because the silicon nitride layer serves a capping layer.

Claim 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al and AAPA as applied to claims 1 -4, 6,8,10-15,17,20 and 21 and further in view of Cogan, US Patent 4,497,107.

Roberts and AAPA are applied supra but lacks the anticipation of wherein etching is performed using a mixture of hydrofluoric acid and nitric acid; and wherein the electrode layer is wet etched using hydrogen peroxide. AAPA discloses wet etching using hydrofluoric acid. Examiner takes official notice that it is well known in the art to wet etch using hydrogen peroxide. Cogan discloses etching using an etching mix of hydrofluoric acid and nitric acid. See column 3, line 3 to 14 and figure 3. In view of this disclosure it would have been obvious to one of ordinary skill in the art at the time of invention to etch using a mixture of hydrofluoric acid and nitric acid as taught by Cogan, in view of the primary reference of Roberts, because nitric acid is a well known additive to hydrofluoric acid in wet etching applications.

***Allowable Subject Matter***

Claims 9 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art references fail to teach: wherein the oxide layer is one of wet-etched and dry-etched, and the electrode layer is wet-etched using hydrogen peroxide and forming an oxide layer on the electrode layer; and one of wet-etching and dry-etching the oxide layer as taught in claims 9 and 19 respectively.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Lebentritt whose telephone number is 571-272-1873. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael S. Lebentritt  
Primary Examiner  
Art Unit 2824

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